SECTION 6.0 STORMWATER OFFSETS AND OFFSET FEES

This section outlines some of the offset options available to applicants and provides guidelines to help local jurisdictions administer offset programs. Offsets may be used in the following situations:

- The use of on-site and off-site BMPs cannot meet the pollutant removal requirement of the 10% Rule;
- The use of off-site areas draining to on-site BMPs cannot meet the pollutant reduction requirement; or
- Construction of on-site BMPs is not feasible or practical.

In these situations, a jurisdiction can allow an applicant to provide an offset or pay an offset fee to meet the pollutant reduction requirement. Applicants are strongly encouraged to make every effort to provide at least some stormwater treatment on the project site, and if necessary, comply through a combination of on-site BMPs and offsets.

What is an Offset?
The Critical Area Criteria define offsets as "structures or actions that compensate for undesirable impacts." Offsets address the impacts associated with uncontrolled stormwater runoff generated from a development site by providing alternative ways to reduce pollutants when on-site BMPs are insufficient or impractical. Offsets must remove a pollutant load equal to or greater than the pollutant removal requirement. Offset fees must be equivalent to the cost of planning, designing, constructing, and maintaining a BMP capable of meeting the pollutant removal requirement.

The clear intent of the criteria is to encourage on-site compliance with the 10% Rule wherever possible; therefore, **offsets are to be used only as a last resort**. An applicant must demonstrate that full compliance with the 10% Rule is not feasible or practical at the site using on-site stormwater BMPs. Supporting documentation, including but not limited to, detailed information about current or historic land use, soil borings, or soil contamination analyses, shall be submitted to the local government with the request to use offsets or pay offset fees. The local government must agree that on-site stormwater BMPs are not feasible or practical and the use of offsets is warranted. Factors that may be considered to determine that on-site compliance is not feasible or practical include:

<u>Physical Factors, such as:</u>
- High water table
- Restrictive terrain
- Severely compacted or contaminated soils or fill
- Lack of space
- Location of underground utilities

<u>Other Factors</u>
- Water dependant uses

- Unique land use activities
- Implementation of a comprehensive stormwater management plan with approved offsets

Offsets must be located within reasonable proximity to the Chesapeake Bay, Atlantic Coastal Bays, their tributaries and associated tidal wetlands, and preferably within the Critical Area itself. The criteria state that, at a minimum, "offsets must be in the same watershed." Although the scale of the watershed is not defined in the criteria, it is generally intended that all offsets will take place in the same jurisdiction in which the development project is located.

In addition, any measure or practice that is used for an offset cannot be a measure that would have been required under existing laws, regulations, statutes, or permits. For example, the restoration of a wetland required as mitigation for a non-tidal wetland impact cannot also be used as a stormwater offset. Similarly, any reforestation required under the Maryland Forest Conservation Act cannot also be used as an offset.

How is an Offset Different from Off-Site Compliance?

Compliance with the 10% Rule through offsets should be clearly distinguished from compliance achieved by providing treatment of off-site drainage areas with an on-site BMP. Treatment of an off-site drainage area with an on-site BMP is a means of increasing the amount of runoff treated by the on-site BMP and, thereby, increasing the amount of pollutant load removed. An offset, on the other hand, is not located on the project site, and may involve activities other than the construction of a BMP. Offsets are used when on-site practices are either infeasible and/or insufficient to comply with the 10% Rule at the development site.

Examples of Acceptable Offset Opportunities

Five offset options or opportunities are described below. However, offset opportunities are not limited to these examples. Jurisdictions and applicants are encouraged to develop innovative ways to comply with the pollutant removal requirement – these will be approved on a case-by-case basis. When identifying offset opportunities, jurisdictions should meet with the appropriate local planning, parks, environmental and public works agencies to identify, review and select the best offset opportunities for the Critical Area. For more information on identifying and implementing offset opportunities, please consult the "Additional Resources" provided in Section 8.

<u>Option 1: Stormwater Retrofits: Constructing a New BMP</u>

One type of commonly used offsets involves stormwater retrofitting to providing treatment in locations where BMPs previously did not exist. This offset option involves constructing a new BMP to serve an existing urbanized area within the Critical Area. New BMPs should be confined to the designs listed in Appendices D and E, and be located in developed areas that are not currently served by stormwater BMPs or are underserved by existing stormwater BMPs. Good candidate sites for new BMP retrofits include public land, such as parks, schools, local government buildings, and recreational areas.

Stormwater retrofits can also be located on private property, such as residential open space, industrial parks and institutional areas. If private lands are used, jurisdictions will need to resolve relevant concerns about ownership, liability, maintenance and compensation. BMPs located on private lands must be maintained as stormwater practices over the long term; therefore, an easement and maintenance agreement must be provided. Jurisdictions or private developers may also acquire the land needed for the retrofit; however, land acquisition costs are likely to be very high in the Critical Area.

The first step in identifying new stormwater retrofit opportunities involves analyzing local land use maps to find publicly-owned land that is undeveloped or in open space. These sites are often the most promising for developing larger regional stormwater facilities, and because they are already publicly owned, this option can be quite cost-effective. Parcels that allow for the construction of a BMP that serves a large drainage area may provide certain economies of scale and opportunities for "banking". However, smaller sites with smaller drainage areas may be suitable for application of infiltration BMPs and off-line structures such as filters and bioretention areas. Although these sites are not as cost-effective as pond systems, they may be easier to locate and build. School grounds, transportation rights-of-way, institutional areas and state/federal land are all good candidate areas.

The pollutant removal associated with the construction of a new BMP should be calculated using Worksheet B and the standard BMP removal efficiency rates (see Section 4). Appropriate plans of the site must be obtained (or developed) in order to calculate existing impervious surface area on the site.

<u>Option 2: Stormwater Retrofits: Converting an Existing BMP to Achieve Higher Pollutant Removal</u>

Improving the efficiency of existing BMPs can be a very attractive retrofit option. Older stormwater BMPs were often designed to control stormwater quantity and not to provide water quality. Some examples include dry detention ponds that were constructed to control floods in the 1970s and 1980s. Consequently, this retrofit option typically involves modifying the existing hydraulic controls in the dry pond to increase detention times, create a permanent pool, form a shallow marsh, or a combination of these. In addition to increasing pollutant removal rates, this retrofit option can also enhance community and landscaping amenities provided by the pond. Generally, the cost associated with retrofitting older BMPs is much lower than constructing a new retrofit BMP.

The most attractive candidates are large dry stormwater management ponds or flood control structures designed to control large design storms (i.e., the 10- and 100-year storm events). The conversion process varies from site to site and typically involves sacrificing a fraction of the total stormwater management storage to detain or retain runoff for pollutant removal. This is done by modifying the riser, excavating the bottom, or by raising the embankment, or some combination thereof. Publicly owned stormwater facilities are probably the best candidates for such retrofits, but private facilities may also be used. In some cases, there may also be strong interest on the part of owners of private stormwater facilities for retrofits, particularly if the existing structure is unattractive, creates nuisance problems, or has chronic maintenance problems.

A second retrofitting approach involves expanding storage capacity or retention times of existing urban lakes and impoundments to improve their pollutant removal performance. Many of these existing impoundments were built for other purposes (e.g., recreation and aesthetics) and are undersized for pollutant removal. Others have lost needed storage capacity because of high rates of sedimentation. The relatively low cost of retrofitting existing impoundments makes this offset option particularly attractive.

To identify old stormwater BMPs that may be retrofit candidates, first contact the local stormwater management authority for information on private and public stormwater management and flood control structures constructed within the jurisdiction. These files usually contain plans and as-built drawings that can be reviewed to identify retrofit opportunities. Ideal facilities are those that are older (generally constructed before 1987), drain a large, heavily developed area, have reasonable construction access, are close to the Critical Area, are not crossed by utility corridors, and control large design storms.

Potential facilities that meet most of the criteria should be checked in the field to determine if a retrofit is feasible. Suitable BMPs should then be referred to the engineering department or consultant to perform the appropriate hydrologic and hydraulic design studies. If a facility for a potential retrofit is privately owned or managed by a third party, it will also be necessary to secure approval from the property owners to install the retrofit. Making residents aware of the benefits of the retrofit and satisfying safety and aesthetic issues during the retrofit design process can generally alleviate citizen concerns.

The pollutant removal associated with the conversion of a new BMP should be calculated using Worksheet B and estimating the removal efficiency rate of the existing BMP. Most likely, the removal efficiency rate of the existing BMP will be somewhat lower than the removal efficiencies in Section 4.0, depending on the age of the BMP. If the existing BMP is a dry pond, applicants should consider using the removal efficiency provided in the National Pollutant Removal Performance Database for Stormwater Treatment Practices (Winer, 2000). This document is available online at: www.stormwatercenter.net. The removal efficiency of other types of existing BMPs can be estimated using the Watershed Treatment Model (Caraco, 2000). To determine the removal efficiency of older facilities, the Watershed Treatment Model takes several factors into account, including design, capture, and maintenance.

Once the applicant has determined the existing pollutant removal rates, a second Worksheet B should be completed to document the ultimate phosphorus removal rate after the BMP is enhanced or retrofitted. The "pollutant removal credit" associated with the improvement of the BMP is the difference between the existing phosphorus removal rate and the final phosphorus removal rate.

Option 3: Stormwater Retrofits: Modifying the Existing Conveyance Network to Enhance Pollutant Removal

The existing conveyance system in a community contains a network of storm drains, swales, ditches and catchbasins, which can provide good opportunities for retrofits. Many jurisdictions have existing stormwater conveyance systems that are purely collection systems with no treatment at the point of collection, discharge point or elsewhere throughout the conveyance. The objective of this retrofit option is to promote greater detention or infiltration within the conveyance system. This can be accomplished by adding extra storage, enhancing exfiltration or employing off-line sedimentation facilities. One typical example is a site where the bottom of a series of catchbasins is removed, excavated and backfilled with stone. This modification allows a portion of the first flush of runoff to be diverted into the soils, rather than through the pipe system. Other engineering solutions involve modifying the storage or release rate of catchbasins to promote settling. Other examples include retrofitting existing residential areas with low-cost dry wells, dry swales, grassed channels with checkdams.

Opportunities to provide treatment at either the collection point or the discharge point should be investigated. In addition, designers can explore whether the storm drain network can be modified to relocate collection points to places where there is adequate land to provide stormwater treatment. The public works department should always be consulted to determine what, if any, possible improvements might be made to the public storm drain system for which it is responsible.

The pollutant removal rate of this offset is likely to be highly specific to the particular site conditions and stormwater conveyance network. Because of the variability of this offset option and innovative systems, the designer and the local jurisdiction working cooperatively with the Commission should determine the phosphorus removal rate.

<u>Option 4: Reducing the Imperviousness of an Existing Property</u>
Some older waterfront areas are so intensely developed that there is no available land for most offset options. As an alternative, these jurisdictions may consider the option of reducing or eliminating impervious cover on publicly or privately owned lands. Some jurisdictions have acquired tax-delinquent properties within the Critical Area. These abandoned properties may be purchased by a developer seeking an offset and can be subsequently converted to vegetated open space and maintained in a perpetual easement. Developers also have the option of purchasing private land for this purpose.

A review of aerial photography and the tax delinquent property rolls can be used to determine if there are any sizeable abandoned parcels. These parcels may be converted to open space within the Critical Area. In some cases, reductions of impervious cover can be accomplished through the reconfiguration of existing parking lots and roads serving schools, government buildings, libraries, and hospitals.

- The pollutant removal credit given for this offset is based on the amount of impervious surface converted to pervious surface. For example, if an applicant removes 2,000 square feet of impervious surface from a property that would satisfy the pollutant removal requirement associated with the construction of a 2,000 square foot building on the project site. Applicants may also reduce imperviousness through the use of permeable pavers. The perviousness of permeable pavers range from 10 to 50%, depending on the product and it must be installed to the manufactures specifications.

The applicant should collaborate with the local government to determine exact imperviousness. An applicant could obtain additional pollutant removal credit by planting the area where impervious surface was removed. Planting native trees and shrubs in the area would result in an additional pollutant credit at a rate of two pounds for every one acre planted. Trees should be planted at a density of 400 trees per acre. Up to 30 percent of the planting may be accomplished with shrubs (one tree equates to three shrubs).

Option 5: Innovative Offset Options

Jurisdictions have considerable latitude to use innovative methods for offsets, as long as they can provide a reasonable estimate of the phosphorus removed. Innovative techniques are encouraged. Several acceptable examples include:

a) *Restore a degraded tidal or non-tidal wetland*
   In urban areas, many floodplain wetlands have been filled or drained to make room for development while increased storm flows and runoff cause streambeds to erode, ultimately disconnecting the stream from its floodplain. Wetland restoration should target degraded tidal or non-tidal wetlands in the Critical Area. Restoration may include removing fill, roads or man-made features; restoring natural water circulation patterns; planting marsh vegetation; and removing bulkheads or other structures. The only requirements would be that the project would need approval by the appropriate State and/or federal permitting agencies and that water quality and habitat benefits generated by the project be documented. A phosphorus reduction of three pounds for each acre of wetland restored can be granted, given that the restored wetlands have considerable ability to reduce phosphorus and other pollutants.

b) *Restore a channelized stream*
   Stream channelization is the practice of straightening stream channels to increase conveyance capacity, eliminate floodplains and drain wetlands. Stream de-channelization is the practice of returning stream channels to as natural a condition as possible, given the constraints, while creating a stable, non-erosive stream channel. The extent that de-channelization can be undertaken is primarily limited by constraints such as adjacent land use, infrastructure, and flood conveyance. Changes in sediment transport within the de-channelized reach can alter erosion and deposition patterns, for better or worse, in downstream waters. Careful hydrologic and hydraulic modeling, as well as careful design is required. A phosphorus reduction of 0.035 pounds for each linear foot of restored stream can be granted (Baltimore County, 2002).

c) *Stream daylighting*
   Stream daylighting is the process of unearthing and re-establishing surface streams that have been enclosed in pipes or culverts. Many of these streams were piped out of convenience to eliminate a floodplain, create additional buildable land, or simply because that was the way things were done. Daylighting can pose significant challenges as a restoration practice. Not only does the practice require the skills and knowledge of channel design, but also buried streams are often constrained by the

lack of available land area, incompatible land uses, infrastructure and utility conflicts, and the fear of negative consequences. Despite these constraints, dozens of urban streams have been successfully daylighted across the country. A phosphorus reduction of 0.035 pounds for each linear foot of restored stream can be granted (Baltimore County, 2002).

d) *Implement a riparian reforestation project*
A riparian forest buffer is a vegetated zone located immediately adjacent to a stream, river or other waterbody, whose vegetation reflects the pre-development riparian plant community, usually a mature forest. Ideally, the minimum buffer width should be 100 feet. Applicants should check with the local buffer requirements and use this as the target width. In some cases, it may be acceptable to establish a non-riparian buffer strip adjacent to other land uses that contribute significant phosphorus pollutant loads (e.g., agricultural and pasture areas). The offset consists of securing a buffer strip easement (if privately owned) and performing the necessary vegetative restoration/reforestation. Ideal sites for riparian reforestation may already be identified through a local watershed plan or Watershed Restoration Action Strategy (WRAS). Local governments and applicants should work cooperatively to select and implement such opportunities.

For this project, a phosphorus reduction of two pounds for each acre planted can be granted.

e) *Install trash interceptors on existing stormwater inlets*
This simple offset opportunity entails the installation of trash interceptors on inlet and outlet pipes to catch the floatable garbage. The local public works agency should be consulted at the planning stages of this project. Based on limited performance monitoring, a phosphorus removal credit of 0.1 pounds per storm drain inlet or outlet treated is appropriate. To get the credit, applicants must demonstrate that a long-term maintenance plan is in place to collect and properly dispose of trapped materials.

f) *Improve existing stormwater ponds by planting forested buffer areas around the facility*
A forested buffer around a stormwater pond has numerous benefits that include improved aesthetics, shade (can lead to reduced water temperatures), additional habitat, and minimized impacts from adjacent land uses. Plantings should comply with state and local dam safety requirements (e.g., no plantings on pond embankment) and should not be located within the maximum design pool elevation. For this project, every acre of forest planting equals two pounds of pollutant removal. Trees should be planted at a density of 400 trees per acres. Up to 30 percent of the planting may be accomplished with shrubs (one tree equates three shrubs).

g) *Develop and implement a public education program about stormwater management*
Structural stormwater practices, while effective, are not capable of removing 100% of pollutants. Stormwater education programs further reduce the likelihood of contamination of stormwater runoff. Two basic types of stormwater education programs are awareness and personal stewardship. Awareness includes raising basic knowledge about stormwater runoff and the Critical Area using signs, storm drain stenciling, and other educational materials. Personal stewardship educates residents about the individual roles they play in the Critical Area and their influence on water quality. Stewardship programs focus on specific messages about positive and negative behaviors that influence phosphorus and stormwater pollution (lawn fertilization, car washing, etc.). It is difficult to assign a specific phosphorus credit for this option, but as a rule of thumb, a reduction rate of one pound of phosphorus per $10,000 invested in education can be assigned. In all cases, education programs must be developed in cooperation with the local government agency responsible for implementing the Critical Area Program. It is difficult to assign a specific phosphorus credit for this option because it is likely to be highly specific to the particular jurisdiction, the proposed program, and the proposed audience. Because of the variability of this offset option, the local jurisdiction working cooperatively with the Commission shall determine the phosphorus removal rate.

h) *Over-designing another pending project*
Under this option, an applicant who is unable to entirely comply with the 10% Rule onsite may over-design another pending project. In this case, over-design is referring to an increase in the amount drainage area treated (more than what is required via the 10% Rule). Over-designing may be accomplished by sizing the BMP to treat a larger drainage area than would normally be required. By over-designing the stormwater management of a pending project, the applicant may receive credit for the additional pounds of phosphorus removed beyond the onsite Critical Area requirements. This option will be considered on a case-by-case basis.

In order to receive credit for this option, the applicant must demonstrate that:

- the over-design is part of the same development parcel as the project not within compliance (i.e., may be phase II of a multi-phased development project)
- built-out plans exist for the entire development project (all phases)
- the over-design meets the State's stormwater regulations
- the over-design meets onsite Critical Area pollutant removal requirements
- the over-design must be in place by the project's completion

For example, a large development site with multiple construction phases is entirely located within the IDA. For phase I of the development site, the applicant is unable to fully meet the pollutant removal requirement. However, the applicant is able to demonstrate that by over-designing the stormwater BMP meant to serve phase II, he/she is not only able to meet the Critical Area pollutant removal requirement for phase II but is also removing enough phosphorus to make up the amount that was not met under phase I. The over-designed BMP must be in place by the completion of phase I.

The pollutant removal associated with the conversion of a new BMP should be calculated using Worksheet B and estimating the pollutant removal requirement for "Phase I". Once the applicant has determined the pollutant removal requirement for the "Phase I", a second Worksheet B should be completed to document the estimated phosphorus removal requirement and the load removed by the over-designed BMP for "Phase II". The "pollutant removal credit" associated with the over-design of the BMP is the difference between the Phase II's pollutant removal requirement and the load removed by the over-designed BMP.

Offset opportunities can be evaluated using a combination of aerial photos, vegetation maps and field verification. These opportunities may already be identified through existing watershed plans, stormwater retrofit and offset inventories, and Maryland Department of Natural Resources' Watershed Restoration Action Strategies (WRAS). Applicants must work cooperatively with the local jurisdiction to select and implement such opportunities.

Other innovative options such as better housekeeping (e.g., street sweeping and storm drain cleanouts) may be approved contingent upon developing a protocol agreed upon by the Commission and local jurisdiction.

<u>Unacceptable Offsets</u>
Any activity or practice that is required under existing statutes, permits, National Pollutant Discharge Elimination System (NPDES) stormwater requirements or regulations may not be used as an offset. For example, a developer cannot take credit for constructing a BMP in a developing area that is already subject to the water quality provisions of the Maryland Stormwater Law. Likewise, a government cannot take offset credits for constructing a regional BMP that is primarily intended to control runoff from new or planned development activities. Additional offsets that are unacceptable include the required mitigation of wetland impacts and required 100-foot buffer plantings (plantings are required when there is a change in land use under Critical Area regulations).

Administering Offsets
The primary responsibility for administering an offset program lies with each local jurisdiction. Offset programs are most effective when the local government develops a stormwater management plan, related regulations that identify offset opportunities and clear methods for implementing them. It is strongly recommended that a jurisdiction develop and use a written application to use offsets in order to fully document why an on-site BMP is not feasible and to ensure that offset measures are adequately identified. An offset application would include the information in the two cases discussed below:

1. Physical factors and/or site conditions prevent the use of any urban BMP at the development site. The offset would be equal to the entire pollutant removal requirement calculated for the site.

2. A stormwater BMP is installed, but is not sufficient to meet the entire pollutant removal requirement for the site. The offset would then be equal to the removal requirement for the project site less the load removed by an on-site BMP.

Generally, an offset program would be administered by the agency that implements the Critical Area and stormwater management regulations. If these two programs are administered by different agencies, for example the Planning and Zoning Department and the Public Works Department, it may make sense for them to work cooperatively on an offset program, but to identify a lead agency for the day-to-day implementation. The lead agency would be responsible for reviewing offset applications, identifying and approving acceptable offsets, overseeing implementation of offsets, and tracking offset program effectiveness. Local jurisdictions have considerable latitude concerning their level of involvement in actually implementing offsets. Three possible approaches to implementing local offset programs are described below.

<u>Approach 1:</u>
In this approach, the local jurisdiction's role is largely restricted to reviewing the proposed offset. The developer is responsible for finding an acceptable offset project and for performing all subsequent design, construction and maintenance activities. The local jurisdiction's responsibility is limited to prescribing general guidelines on acceptable offset options, reviewing the developer's offset plan for conformance with all local regulations, holding a performance bond, inspecting construction of the offset, and either monitoring or assuming subsequent maintenance.

<u>Approach 2:</u>
In this approach, local jurisdictions have a more active "brokering" role whereby they become involved in assisting an applicant in implementing the offset. In this situation, the developer is still required to design, construct and maintain the offset, however, the local jurisdiction works closely with the developer to help him/her find a suitable offset option and a site that will meet his/her needs. If the offset site is located on property owned by a third party, the local jurisdiction assists the developer in approaching the property owner and obtaining any necessary easements and maintenance agreements. In short, the local jurisdiction's role is to actively facilitate offsets.

<u>Approach 3:</u>
In this approach, the local jurisdiction takes on responsibility for all phases of the offset program. In contrast to the other approaches, the developer is only responsible for paying an "offset fee." The local jurisdiction then identifies a site and an appropriate BMP, which is constructed using the collected offset fee. This approach works most effectively when a local jurisdiction has conducted a detailed inventory of potential sites and potentially viable stormwater treatment options, from which it selects priority sites. The local jurisdiction then performs preliminary design and cost analyses for the projects, and determines an appropriate fee sufficient to cover the design and construction of the project, as well as any purchase, lease, or easement cost. In some cases, maintenance costs may also be included. The local jurisdiction then contracts for the design and construction of the offset project and constructs the individual offset within two years of the date that the offset fee is collected. In

most cases, the local jurisdiction will maintain the offset projects. The two year provision may be waived if the local jurisdiction is accumulating funds for a larger project (i.e., such as a regional stormwater facility). To receive this waiver, the local government must have a plan in place describing the use of accumulated funds.

Local jurisdictions have the additional responsibility of tracking and reporting the overall performance of the offset program to the Critical Area Commission (CAC) and interested citizens.

The three approaches attempt to recognize the fact that the need for offsets will vary from jurisdiction to jurisdiction. For example, a small municipality that may rarely, if ever, receive an offset application may opt for the first approach in order to reduce its administrative burden. On the other hand, a jurisdiction that receives several applications a year may wish to implement the second or third approach; these reduce possible delays for desirable development projects and provide greater control in which offsets are used and where they are located.

Elements of a Local Offset Program

In order to effectively implement a local offset program, a local government must address four elements in its local codes, ordinances, regulations, or policies. These are an inventory of offset opportunities, an implementation mechanism, a financing mechanism, and a tracking system as described below. The level of effort and responsibility for each element varies depending on which offset program approach is selected by a local jurisdiction.

<u>Inventory of Offset Opportunities</u>

The first element necessary to implement an offset program is an inventory of potential offset opportunities within the jurisdiction. The jurisdiction must perform or obtain consultant services to perform a survey to identify the most suitable sites and techniques for offsets. This element is needed for all approaches to implementing offset programs, and the scope of the local jurisdiction's effort and involvement depends on which approach they are using to implementing the offset program. The inventory is important for a number of reasons. First, a list of potential sites/techniques enables the local jurisdiction to quickly respond to an offset application. Without a list of potential sites, it is likely that local jurisdictions may encounter significant delays in processing applications. Second, the inventory helps local jurisdictions set priorities for its offset program and provides a rational basis for selecting the most effective and least expensive offset options. Finally, an offset inventory allows for an accurate determination of offset fees. Without an inventory and associated cost data, it is difficult for local jurisdictions to establish an appropriate offset fee. Costs will vary by location. Cost data specific to conducting a stormwater retrofit inventory is available in Appendix G.

<u>Implementation Mechanism</u>

In order to effectively administer an offset program, a local jurisdiction must have clear and concise criteria specifying how the program works and which agency takes the lead responsibility. These criteria must be reviewed and approved by the Critical Area Commission. This generally involves provisions in local codes or ordinances regarding who will be responsible for each of the four major phases of offset implementation (planning, design, construction, and maintenance) and the time frame in which they will be accomplished. The provisions should also specify how offsets located on properties owned by the local government or a private individual shall be maintained. For example, if a local government allows a riparian buffer planting as an offset, the trees cannot be removed at a later date to accommodate a development project. A description of the four phrases is provided below.

The planning phase involves selecting the most suitable sites from the offset inventory and preparing preliminary concept designs and associated cost estimates for the sites selected. It also includes estimating the amount of pollutant load controlled by the offset projects and calculating the total cost per pound removed. This phase also involves determining whether the offset will be protected by the jurisdiction's ownership of the property or through an easement or similar legal instrument.

The design phase includes the final design of the offset projects, including hydrologic/hydraulic computations, geotechnical engineering, final design of the structure and preparation of construction specifications and bid documents.

The construction phase involves advertising for bids and awarding the contract for the construction of the project as well as oversight and inspection during construction.

The maintenance phase includes defining and assigning maintenance responsibilities over a minimum 20-year period, negotiating maintenance tasks and schedules, and allocating a maintenance budget. Maintenance also includes executing appropriate easements or other legal instruments to ensure that offsets located on properties owned by the local government or a private individual are maintained and not eliminated during subsequent redevelopment efforts. For example, if a local government allows a stream buffer reforestation as an offset, the buffer vegetation cannot be removed at a later date to accommodate a development project.

A Financing Mechanism

An important element of an offset program is the option to collect offset fees when appropriate. It may be appropriate to collect offset fees when the identified offset opportunities are large and costly or when an offset opportunity has been identified but cannot be implemented immediately. The collection of offset fees allows a developer to pay the local jurisdiction a fee to finance public sector implementation of an offset. The amount of the fee is variable and is based on the amount (pounds) of the unmet pollutant removal requirements at the developer's project site. The fee must be established to recover all of the costs incurred by the local jurisdiction in implementing the offset program including planning, design, construction and maintenance.

A Tracking System

A tracking system is needed in all local offset programs, to demonstrate in reasonably quantitative terms, that the program is, in fact, accomplishing its intended objective. Local jurisdictions must keep detailed and accurate records of the pollutant loadings associated with specific projects, of the fees collected, and of the fees expended on the individual and cumulative remedial measures. They must demonstrate that the total amount of phosphorus removed by offset measures is equal to or greater than the total phosphorus load generated by development projects that do not provide treatment on site.

Offset Fees

In some jurisdictions, it may be more practical to collect offset fees on a project-by-project basis, rather than implement an overall offset program that may or may not include offset fees. If a jurisdiction opts to collect offset fees, specific provisions relating to the collection and expenditure of the offset fees will be included in the local zoning or Critical Area ordinance. These provisions will ensure that adequate fees are collected, that fees are spent on appropriate water quality improvement projects, and that projects are accomplished in a timely manner. Jurisdictions must show that the fees collected can cover the costs of phosphorus removal or an equivalent water quality improvement.

Because determining an offset fee can be a complex task for local jurisdictions this section provides data on the actual costs of stormwater management and general guidelines for setting a locally appropriate offset fee. Brown and Schueler (1997) evaluated the actual costs for 73 stormwater BMPs in the mid-Atlantic region, and developed cost equations and cost per cubic foot of water quality storage provided. The data from this study can provide the basis for setting an offset fee that fully recovers the cost to remove phosphorus from one acre of impervious cover. Based on this data it was determined that the fee necessary to fully recover the cost to remove phosphorus from one acre of impervious cover ranges from $22,500 to $38,400 per pound of phosphorus removed. These costs (adjusted for inflation) account for several aspects of stormwater BMP implementation including construction costs, design, engineering, permitting, and maintenance. Additional information on this cost estimate can be found in Appendix G.

Costs may vary and jurisdictions are encouraged to develop their own fees utilizing this information and more specific local cost data. However, for many local jurisdictions, very little cost data is available to estimate the costs associated with local offset programs. Costs can vary widely depending on the nature of the offset option(s) used and the availability of suitable sites. As a result, it is not likely that local jurisdictions will be able to accurately assess offset costs until they complete the offset inventory, screen suitable options and conduct preliminary design/cost estimates. Therefore, local jurisdictions may decide to use a fee within the range included herein until additional data is collected in the local jurisdiction based on the implementation of specific projects. Once projects have been accomplished, information regarding the cost of the specific BMPs and the pollutant load removal estimates can be used to determine a per pound cost. The final offset fee for the jurisdiction would then be the total cost of the BMPs divided by the total phosphorus load removed expressed in terms of dollars per pound of phosphorus.

Local jurisdictions may consider waiving or modifying these costs for small property owners (sites of one acre or less), brownfields, or other special infill sites. Local jurisdictions need to include provisions for this fee modification in their critical area or zoning ordinance.

If a local jurisdiction chooses to establish its own offset fees, it must consider all of the costs associated with the offset. The offset fee should reflect the costs associated with the planning, design, construction, and maintenance of offset facilities constructed (see Appendix G).

Planning

Planning costs include the staff time necessary to conduct an inventory of offset opportunities and involve reviewing plans, checking sites in the field, coordinating with various local agency staff, and screening sites. Additional costs may be associated when private lands are used because staff effort would be needed to contact and negotiate with private landowners. In some cases, costs associated with watershed-scale modeling will need to be considered. The planning process can be facilitated if a jurisdiction has previously completed a comprehensive watershed plan with specific information about stormwater management.

Design Costs

Design costs are incurred in preparing and obtaining approval for the offset project plan, in preparing construction specifications and drawings and for construction oversight and inspection services. Design costs for construction of typical offsets run 15 to 25% of the total construction cost. This depends on the complexity of the site characteristics and if concept plans and details are available for the proposed offset.

Construction Costs

Construction costs widely vary depending on the offset project. Estimated costs of stormwater retrofits are provided in Appendix G. Stream restoration costs are highly variable and can range from $10 to $300 per linear foot. These costs do not account for any utility relocations, bridge/culvert replacement, or potential land acquisition.

Local jurisdictions should also take into account the cost of land. Although it is preferable to implement offsets on publicly owned lands, this is often not possible, and the cost of fee-simple acquisition or easement acquisition must be considered.

Maintenance

Maintenance is frequently overlooked, but is necessary to maintain the pollutant removal function of a stormwater BMP and many other potential offset projects. Consequently, a mandatory element of any offset program is the reservation of funds to cover anticipated maintenance costs over a 20-year period. Stormwater BMP annual maintenance costs are estimated to be 3 to 5% of the initial construction cost and cover both routine tasks (e.g., grass mowing, inspection, debris removal) and sediment removal. The incremental maintenance costs associated with offsets that involve retrofitting an existing BMP are largely confined to extra sediment removal expenses, which are estimated to be 1 to 2% of the initial construction cost per year.